

LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA16 | Ladbroke and Southam

**Bat trapping/radio tracking study -
Long Itchington and Ufton Wood (EC-006-003)**
Ecology

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Appendix EC-006-003

Environmental topic:	Ecology	EC
Appendix name:	Bat trapping/radio tracking study – Long Itchington and Ufton Woods	006-003
Community forum area:	CFA16/Ladbroke and Southam CFA17/Offchurch and Cubbington CFA18/Stoneleigh, Kenilworth and Burton Green CFA19/Coleshill Junction CFA21/Drayton Bassett, Hints and Weeford CFA20/Curdworth to Middleton CFA22/Whittington to Handsacre	253

Contents

Appendix EC-006-003	i
1 Introduction	1
2 Overview	3
3 Methodology	5
3.1 Data gathering	5
3.2 Trapping	7
3.3 Radio-tracking	10
3.4 Limitations	11
4 Results	13
5 Discussion	23
 List of figures	
Figure 1: Transect and static survey locations	6
Figure 2: Trapping locations	8
Figure 3: Locations of roosts found during radio tracking	18
Figure 4: Foraging areas identified during radio tracking	21
 List of tables	
Table 1: Details of bats trapped and tagged during the surveys	13
Table 2: Results of emergence surveys and dawn return surveys on roosts identified through radio tracking	19

1 Introduction

- 1.1.1 This document is an appendix which forms part of Volume 5 of the Environmental Statement (ES) for the Proposed Scheme. It details ecological baseline data collected for the following community forum area (CFA): CFA16: Ladbroke and Southam.
- 1.1.2 The document should be read in conjunction with Volume 2 (Community forum area reports), Volume 3 (Route wide) and Volume 4 (Off-route).

2 Overview

- 2.1.1 This report details trapping and radio tracking works undertaken to investigate the distribution of bats within and in the vicinity of Long Itchington and Ufton Woods Site of Special Scientific Interest (SSSI), an area of ancient woodland in Warwickshire centred on OS Grid Reference SP388627. This work was undertaken to inform the assessment. The focus of the work was identifying habitat use by barbastelle (*Barbastella barbastellus*).
- 2.1.2 A suspected barbastelle call was recorded during static surveys along the edge of a small block of woodland approximately 200m south of Long Itchington and Ufton Woods SSSI within the grounds of Dallas Burston Polo Club (static recorder location 030-BA2-127006, Volume 5: Map Book – Ecology, Map EC-06-086, C6) during the week beginning the 01 August 2012.
- 2.1.3 In response to the possible presence of barbastelle, the number of static survey locations was increased and targeted potential key foraging and commuting habitats for this species. A low level of bat activity by barbastelle was recorded adjacent to a large ornamental pond located within the grounds of Dallas Burston Polo Club (static location 030-BA2-127003, Volume 5: Map Book – Ecology, Map EC-06-086, D5) in August 2012. A total of three passes, including foraging activity, were recorded at 00.01 on the 19 August 2012 and one call was detected at 21.28 on the 20 August 2012. In addition one barbastelle pass was confirmed at this location in August 2013.
- 2.1.4 All species of bat are fully protected under The Habitats Regulations 2010¹ through their inclusion on Schedule 2. In addition, barbastelle is an Annex II species of the EC Habitats Directive² and is a species of principal importance identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)³. Barbastelle is rare in England with estimated population numbers of 4,500⁴. At the beginning of the 20th century the species was known to be widely distributed in southern England and parts of Wales. The Proposed Scheme in Warwickshire is at the northern part of the barbastelle's range in England and in Europe.
- 2.1.5 Due to the conservation status of the barbastelle, detailed survey work was required to provide more information on the roosting, commuting and foraging behaviour of the species, in those areas adjacent to the land required for construction of the Proposed Scheme, in order to better understand any potential effects of the Proposed Scheme and to inform the design of mitigation, if required. The survey work involved the trapping, radio-tagging and tracking of bats and was focused on barbastelle. These works form part of wider survey efforts to assess the assemblage of bat species within and in the vicinity of Long Itchington and Ufton Woods SSSI. Full details of other bat surveys are presented in Volume 5: Appendix EC-003-003.

¹ Her Majesty's Stationary Office, London. *The Conservation of Habitats and Species Regulations 2010* (S.I. 490).

² Species listed on Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive). This is the means by which the European Community meets its obligations as a signatory of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). In the UK the Directive has been transposed into national laws by means of the *Conservation (Natural Habitats, & c.) Regulations 1994* (as amended) as consolidated by The Conservation of Habitats and Species Regulations 2010 (as amended – the Habitats Regulations). Annex II species are rare/threatened on a European level.

³ *Natural Environment and Rural Communities Act 2006* (Chapter 16), Her Majesty's Stationery Office.

⁴ Battersby, J. (2005), *UK Mammals: Species Status and Population Trends First Report by the Tracking Mammals Partnership*. JNCC/Tracking Mammals Partnership: Peterborough.

3 Methodology

3.1 Data gathering

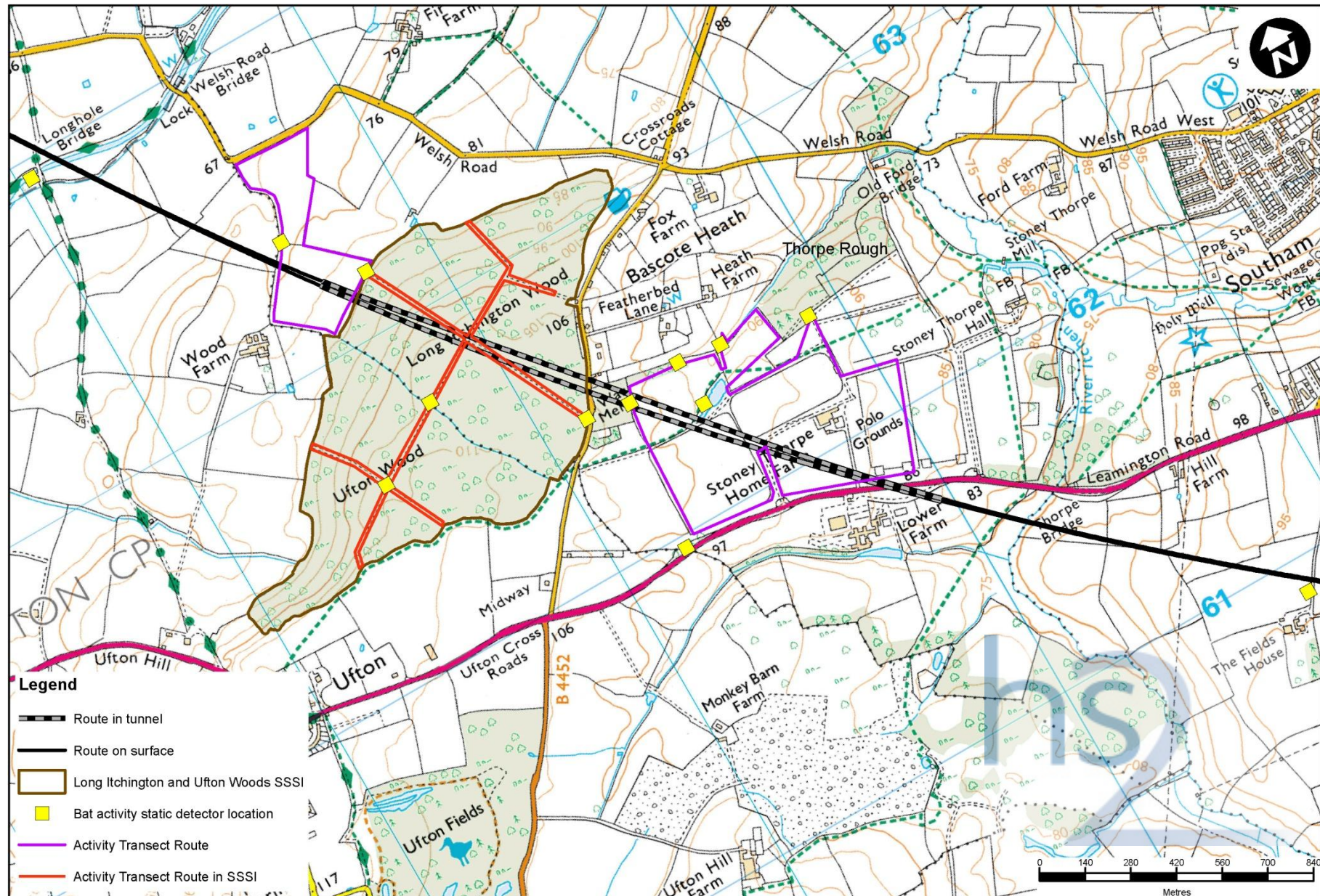
3.1.1 The assessment of potential use of habitats by bats has made use of data from the following sources: Ordnance Survey maps, aerial photography, Warwickshire Biological Records Centre, and data from Phase 1 habitat surveys carried out in support of the assessment (Volume 5, Appendix EC-001-003, Section 4).

3.1.2 The desk study data was used to map known roosts and potential foraging and commuting corridors to build an initial picture of how bat species may be using the landscape.

Transect surveys and automated static detector surveys

3.1.3 To ascertain the assemblage of bat species and levels of bat activity a combination of transect surveys, automated static surveys, ground level tree assessments, tree climbing and building assessments was used. The results of these surveys are reported in Volume 5: EC-003-003. The location of transect surveys and static surveys within and in the vicinity of Long Itchington and Ufton Woods SSSI are presented in Figure 1.

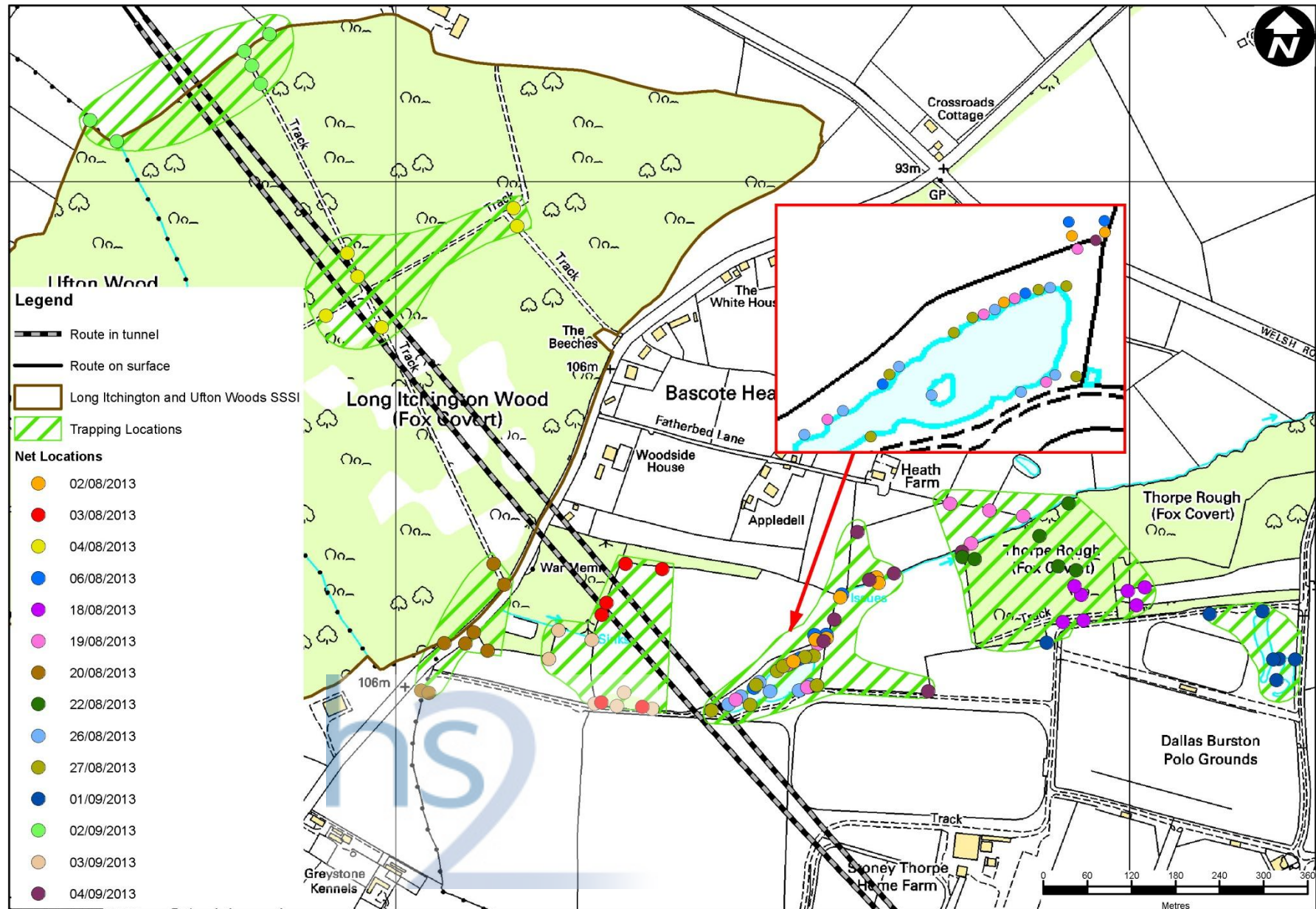
Figure 1: Transect and static survey locations



3.2 Trapping

- 3.2.1 A licence was granted by Natural England (licence number 20131065) for up to ten barbastelle bats to be captured and fitted with radio-tags. The licence also allowed capture and radio-tagging of between two and five individual bats from other species including: brown long-eared bat, Natterer's bat, Brandt's bat, whiskered bat, Daubenton's bat, Leisler's bat and serotine.
- 3.2.2 Trapping focused specifically on Long Itchington and Ufton Woods SSSI, and habitat corridors that link fragments of ancient woodland and suitable foraging habitat for barbastelle. Long Itchington and Ufton Woods SSSI is the largest area of ancient woodland in the area and has good connectivity to other fragments of ancient woodland including Thorpe Rough. Within the wider landscape, the Grand Union Canal (approximately 1.5km north of the SSSI) provides a strong habitat link between fragments of ancient deciduous woodland including Print Wood (1.6km north of the SSSI). Surveys were also conducted in the ground of the Dallas Burston Polo Club approximately 0.5km south-east of the SSSI. Barbastelle are generally associated with woodland, predominantly ancient and semi-natural woodland, which frequently has high levels of humidity. Maternity colonies have a strong tendency to be sited towards the north or north-west side of the brow of low wooded hills. Long Itchington and Ufton Woods SSSI and Thorpe Rough were therefore identified as potentially suitable habitat for breeding barbastelle in addition to other bat species.
- 3.2.3 Trapping was carried out during three sessions, with between three and five nights netting within each session:
- session 1: 2-7 August 2013 (three nights);
 - session 2: 18-22 August 2013 (four nights); and
 - session 3: 26 August-3 September 2013 (five nights).
- 3.2.4 Surveys focused specifically on Ufton and Long Itchington Woods SSSI and on habitats with confirmed activity by barbastelle, in addition to habitat corridors that link fragments of ancient woodland and were considered to contain suitable foraging habitat for barbastelle.
- 3.2.5 Trapping was carried out at seven locations as shown in Figure 2. These locations were selected to maximise the chances of catching barbastelle bats. Some trapping locations were repeated between the three trapping sessions.

Figure 2: Trapping locations



- 3.2.6 Trapping effort included the use of five mist nets plus one harp trap on each trapping evening. A range of mist net sized were used (2m, 3m, 6m, and 9m, with a 50 denier, 38mm mesh size) and a single 2m by 2m harp trap was used (Austbat 2 bank). An ultrasonic lure was used in combination with the harp trap at all trapping locations from the 19 August 2013 onwards. The lure was programmed to play a combination of calls (including the social vocalisations of barbastelle) to attract flying bats and increase the likelihood of catching bats.
- 3.2.7 Trapping commenced at sunset and terminated between 00:00 and 04:00. The extension of trapping hours was due to the observed pattern of activity by barbastelle recorded during static surveys. If the weather became unsuitable (temperatures below 8°C and/or heavy rain or wind) the trapping was terminated to avoid capturing bats that could become torpid. Upon capture bats were removed from the traps under the supervision of the licence holder and by ecologists with a Natural England bat licence or a suitably experienced and qualified person (under the direction of the licence holder) and transferred to a clean cloth bag. The bats were then sexed, weighed, forearm measured, reproductive status ascertained and any other general health observations noted.
- 3.2.8 Body mass and forearm length were measured respectively with a digital scale to the nearest 0.1g and a calliper to the nearest 0.1mm. Sex was assessed by inspecting genitalia (Racey, 1988⁵), and wings were trans-illuminated to distinguish juveniles from adults, the former showing cartilage epiphyseal plates in finger bones and more tapered finger joints (Anthony, 1988⁶). Reproductive status was assessed according to Racey (1988).
- 3.2.9 Any bats selected for radio-tagging were retained to have a radio-transmitter attached and all other bats were released as soon as possible during the hours of darkness on the trapping evening. Only bats considered suitably healthy and of a minimum weight were selected for radio-tagging; the weight of the radio-tag needing to be less than 5% of the animals weight. Female bats, and in particular reproductive females, were radio-tagged in preference to male bats to identify important breeding colonies. No pregnant females were captured but had they been the tagging of heavily pregnant females would have been avoided.
- 3.2.10 Transmitters were attached dorsally between the shoulder blades using Skin-Bond® (Pfizer Inc) from which fur was clipped. The animals fitted with radio-transmitters were released on the same night of capture once the transmitter was made secure.
- 3.2.11 Bat droppings collected during the processing of individual small *Myotis* bats (whiskered/Brandt's/Alcathoe) were transferred to a sterile sample pot for subsequent DNA analysis, in order to determine the potential presence of these cryptic species in the study area.

⁵ Racey, P.A. (1988), Reproductive assessment in bats. In: Kunz, T.H. (Ed.), *Ecological and Behavioral Methods for the Study of Bats*. Smithsonian Institution Press, Washington DC and London, pp.31–45.

⁶ Anthony, E.L.P. (1988), Age determination in bats. In: Kunz, T.H. (Ed.), *Ecological and Behavioral Methods for the Study of Bats*. Smithsonian Institution Press, Washington DC and London, pp.47–58.

3.3 Radio-tracking

- 3.3.1 Once trapped and tagged the released bats were immediately radio tracked using the receiver equipment. Each individual bat was tracked overnight between dusk and dawn, terminating between 00:00 and dawn, with the aim of using a combination of homing, close-approach and sequential triangulation when the bat was assumed to be foraging at a particular location^{7,8,9} depending on the accessibility of the location, to identify core areas of foraging activity.
- 3.3.2 The bats were tracked as close as possible on foot and by car using a Biotrack 'Sika' receiver and a Yagi 3-element antenna and/or a dipole antenna attached to a car roof. To determine the direction in which to follow bats strongest signal strength was used. The surveyor then recorded the time, compass bearing, GPS reading and weather onto data sheets in the field.
- 3.3.3 The assumed activity by the bat was recorded. Rapid, directional movements between distant sites were classified as commuting; a bat which kept flying within a defined area of variable size was recorded as foraging. In areas where it was not possible to close approach the tagged bat the surveyors carrying out the tracking using the local road network to circle around the area in which the tagged animal was assumed to be in and repeated bearings (sequential triangulation), using the direction of the strongest signal, were taken. Each new location was at least 50m apart and a new bearing taken appropriately every ten minutes. If the signal couldn't be heard or was lost then the surveyor would move on foot or by car around the study area until signal was picked up.
- 3.3.4 The core foraging areas identified within this study at the Dallas Burston Polo Club and within Long Itchington and Ufton Woods SSSI were accessible allowing bearings to be taking from a number of locations. Access within the quarry at Stockton was restricted but surveyors were able to circle around the quarry using public access roads. This increased the surveyor's confidence of the location of bats within these areas. Each bat fitted with a radio-transmitter was tracked for a minimum of three nights and for as long as a signal could be picked up.
- 3.3.5 The directional receivers were used to determine the position of radio-tagged bats during the day (daytime roost locations). The position of bats was located using the Homing methodology (Russo et al., 2002¹⁰ and Entwistle et al. 2006¹¹). The location of each tree roost was recorded using a GPS and, where possible, the roost cavity was identified using the directional antenna and using binoculars from the ground.
- 3.3.6 Emergence surveys were undertaken using bat detectors and infrared video of identified roosts, where accessible.

⁷ White GC & Garrott RA (1990), *Analysis of wildlife radiotracking data*. Academic Press, San Diego, California, USA.

⁸ Razgour, O. Hanmer, J. and Jones, G. (2011), *Using multi-scale modelling to predict habitat suitability for species of conservation concern: The grey long-eared bat as a case study*.

⁹ Parsons, K.N. and Jones, G. (2003), *Dispersion and habitat use by Myotis daubentonii and Myotis Nattereri during the swarming season: implications for conservation*.

¹⁰ Russo D., Jones G. & Miglioni A. (2002), *Habitat selection by the Mediterranean horseshoe bat, Rhinolophus euryale* (Chiroptera: Rhinolophidae) in a rural area of southern Italy and implications for conservation. *Biological Conservation* 107: 71-81.

¹¹ Entwistle, A.C. Racey, P.A. Speakman, J.R (1996), *Habitat exploitation by a gleaning bat, Plecotus Auritus*. *Physiological Transactions of the Royal Society of London* 351B: 921-931.

3.4 Limitations

- 3.4.1 Trapping surveys were delayed until 2 August 2013 due to lack of access within Long Itchington and Ufton wood SSSI. Habitats over 100m from the land required for construction of the Proposed Scheme had restricted access which included core foraging habitats for Daubenton's and noctule bats. Restricted access affected the accuracy of the bearings obtained during the radio tracking. In addition, restricted access to a small area of woodland south of Long Itchington and Ufton Woods SSSI (Bascote Heath Wood) meant that it was not possible to ascertain the precise roosting location of one Natterer's tree roost.
- 3.4.2 Radio tracking surveys commenced on 3 August 2013 and continued until 6 September 2013. This only covered the late summer to early autumn period of bats yearly activity cycle. The habitat use by bat species will vary throughout the year. As the population dynamics for each species varies through the year, trapping at only one particular time in the season may have affected which species were caught, and other factors such as reproductive status and the ratio of males to females. However this is not seen as a major limitation to the survey. The results of the trapping surveys confirmed the known assemblage of bats within this area; only three species which are part of the bat assemblage in the area were not caught during trapping: serotine, barbastelle and Nathusius' pipistrelle. The trapping sessions coincide with the time of year when barbastelle activity has been confirmed within this area through static surveys. The static surveys monitored bat activity each month between June and October 2012 and between April and September 2013. The results of the static surveys showed low levels of seasonal barbastelle activity, with only a small number of calls recorded during August and September.
- 3.4.3 The signal strength from the radio tag can vary according to the terrain and height of the tagged bat as well as according to its distance from the receiver. Therefore, signal strength is not a straightforward measure of distance from the bat and the accuracy of identifying the location bats through radio-tracking is limited.

4 Results

Trapping

- 4.1.1 A total of 75 bats were caught during the trapping surveys. The full details of the trapping survey results are given in Table 1. Six of the bats caught during the trapping session had radio tags fitted and were tracked during the period 3 August 2013 to 6 September 2013. These species are highlighted in Table 1.
- 4.1.2 No barbastelle were trapped during the survey.
- 4.1.3 Four samples of *Myotis* droppings that were collected during the trapping were sent to the University of Warwick for DNA analysis. Two sets of droppings were confirmed as Brandt's bat. The analysis of the other two samples was inconclusive.

Table 1: Details of bats trapped and tagged during the surveys

Date	Time of capture	Species	Sex (Male/Female)	Age (Adult/Juvenile)	Reproductive status ¹²	Weight (g)	Forearm length (mm)	Notes ¹³
02 August 2013	21:52	<i>Pipistrellus</i> spp.	-	-	Unknown	-	-	Escaped
02 August 2013	22:00	<i>Myotis daubentonii</i>	M	A	Swollen E	8	36.2	
02 August 2013	22:00	<i>Pipistrellus pygmaeus</i>	M	A	Swollen E, orange buccal glands	5	31.9	
02 August 2013	22:00	<i>Myotis nattereri</i>	F	A	NP	8.5	37.9	Radio tracked from 03 August 2013 (bat 1)*
02 August 2013	22:00	<i>Myotis nattereri</i>	M	A	Swollen E	6.5	38.6	
02 August 2013	22:00	<i>Myotis daubentonii</i>	M	A	Swollen E	8	38.1	
02 August 2013	22:00	<i>Myotis daubentonii</i>	F	A	Post-lactating	8.5	36.3	Radio tracked from 08 August 2013 (bat 2)*
02 August 2013	22:00	<i>Myotis mystacinus</i>	F	A	Non-breeding	6	34	Droppings sent to for DNA analysis

¹² E = Epididymides (part of male reproductive system), swelling indicates male in breeding condition. NP = Nipple Parous, indicates a female bat which has given birth one or more times. Buccal glands are in the corners of the mouth; these swell in the mating season. Post-lactating – indicates a female which has given birth and suckled young.

¹³ (bat #) – Indicates ID given to bat for tracking survey.

Appendix EC-006-003 – C253 Bat trapping/radio tracking study | Results

Date	Time of capture	Species	Sex (Male/Female)	Age (Adult/Juvenile)	Reproductive status ¹²	Weight (g)	Forearm length (mm)	Notes ¹³
02 August 2013	22:00	small <i>Myotis</i>	-	A	Non-breeding	-	-	Released due to very heavy and sudden rainfall
03 August 2013	21:40	<i>Pipistrellus pygmaeus</i>	M	A	Swollen E	5	29.7	
03 August 2013	21:40	<i>Pipistrellus pipistrellus</i>	F	A	NP	5	32.4	
03 August 2013	21:55	<i>Pipistrellus</i> spp.	F	A	Post-lactating	5	30.9	
03 August 2013	23:50	<i>Pipistrellus pygmaeus</i>	F	A	Post-lactating	6	31.9	
06 August 2013		<i>Pipistrellus</i> spp.	-	-	Unknown	-	-	Escaped
06 August 2013		<i>Pipistrellus</i> spp.	-	-	Unknown	-	-	Escaped
06 August 2013	21:45	<i>Myotis mystacinus/Myotis brandtii</i>	F	A	NP	7.6	35.4	Droppings sent for DNA analysis
06 August 2013	21:45	<i>Myotis brandtii</i>	M	A	Not obvious	5	42.9	Droppings sent for DNA analysis
06 August 2013	22:10	<i>Myotis nattereri</i>	F	A	Post-lactating	7.5	38	
18 August 2013	22:45	<i>Plecotus auritus</i>	F	A	Post-lactating	8	39.2	
18 August 2013	22:45	<i>Plecotus auritus</i>	M	A	Non-breeding	6	39.1	
19 August 2013	21:15	<i>Plecotus auritus</i>	F	A	Post-lactating	7.5	39.5	
19 August 2013	21:15	<i>Plecotus auritus</i>	F	A	Post-lactating	8.5	40	
19 August 2013	21:15	<i>Plecotus auritus</i>	F	A	Post-lactating	8.5	38.6	
19 August 2013	21:30	<i>Plecotus auritus</i>	M	A	Swollen E	7	38.6	
19 August 2013	21:00	<i>Pipistrellus pygmaeus</i>	M	A	Non-breeding	4	30.1	
19 August 2013	21:00	<i>Pipistrellus pipistrellus</i>	F	A	Unknown	5.5	31.5	

Date	Time of capture	Species	Sex (Male/Female)	Age (Adult/Juvenile)	Reproductive status ¹²	Weight (g)	Forearm length (mm)	Notes ¹³
19 August 2013	21:25	<i>Plecotus auritus</i>	F	A	Post-lactating	8.8	38.4	
19 August 2013	21:50	<i>Plecotus auritus</i>	M	J	n/a	8	38.5	
19 August 2013	22:30	<i>Plecotus auritus</i>	M	A	Non-breeding	8	38.5	
19 August 2013	22:30	<i>Plecotus auritus</i>	M	A	Non-breeding	7.5	37.1	
19 August 2013	21:20	<i>Myotis mystacinus</i>	F	A	Non-breeding	5	35.7	Droppings sent for DNA analysis
19 August 2013	23:00	<i>Plecotus auritus</i>	F	A	Non-breeding	7.5	38.5	
19 August 2013	23:15	<i>Plecotus auritus</i>	M	A	Non-breeding	8	37.1	
20 August 2013	21:20	<i>Pipistrellus pipistrellus</i>	F	A	Non-lactating	5.5	34.1	
20 August 2013	21:25	<i>Plecotus auritus</i>	F	J	n/a	6.5	39.4	
20 August 2013	21:35	<i>Nyctalus noctula</i>	M	A	Non-breeding	32.2	52.4	
20 August 2013	21:35	<i>Nyctalus noctula</i>	M	A	Swollen E	32	50.5	Radio tracked from 21 August 2013(bat 3)*
20 August 2013	21:35	<i>Nyctalus noctula</i>	M	A	Unknown	30	55.1	
20 August 2013	23:00	<i>Pipistrellus pipistrellus</i>	M	A	No swollen E	4.5	30.5	
20 August 2013	23:00	<i>Pipistrellus pipistrellus</i>	F	A	No swollen E	4.7	32.65	
22 August 2013	20:50	<i>Plecotus auritus</i>	F	A	Post-lactating	8	38.85	
22 August 2013	21:15	<i>Myotis nattereri</i>	M	A	Non-breeding	7.5	39.1	
22 August 2013	23:10	<i>Plecotus auritus</i>	M	A	Non-breeding	7	37.6	
26 August 2013	20:50	<i>Plecotus auritus</i>	M	A	No swollen E	6.5	37.5	

Appendix EC-006-003 – C253 Bat trapping/radio tracking study | Results

Date	Time of capture	Species	Sex (Male/Female)	Age (Adult/Juvenile)	Reproductive status ¹²	Weight (g)	Forearm length (mm)	Notes ¹³
26 August 2013	21:25	<i>Nyctalus noctula</i>	M	A	Slight swollen E	34	51	
26 August 2013	22:40	<i>Nyctalus noctula</i>	M	A	Breeding	30.5	49.2	
26 August 2013	23:45	<i>Myotis nattereri</i>	M	A	Non-breeding	7	37.5	
26 August 2013	01:45	<i>Plecotus auritus</i>	F	A	Non-breeding	8.25	39.4	
26 August 2013	01:50	<i>Pipistrellus pipistrellus</i>	F	A	Non-breeding	Not recorded	32.95	
26 August 2013	03:40	<i>Myotis daubentonii</i>	F	A	Non-breeding	9.5	37.9	Radio tracked from 28 August 2013 (bat 4)*
26 August 2013	05:10	<i>Myotis nattereri</i>	F	A	NP	7.75	38.1	Same bat tagged on 02 August 2013
26 August 2013	05:10	<i>Pipistrellus pygmaeus</i>	M	A	Non-breeding	4.25	30.05	
27 August 2013	20:35	<i>Pipistrellus pygmaeus</i>	M	J	n/a	Not recorded	30.7	
27 August 2013	22:20	<i>Pipistrellus pipistrellus</i>	M	A	Unknown	Not recorded	31.5	
27 August 2013	22:50	<i>Plecotus auritus</i>	M	A	Non-breeding	8	Not recorded	
27 August 2013	02:30	<i>Nyctalus noctula</i>	F	A	Non-breeding	25	53.6	
27 August 2013	03:05	<i>Nyctalus noctula</i>	M	A	Non-breeding	26	52.2	
27 August 2013	03:05	<i>Nyctalus noctula</i>	-	-	Unknown	-	-	Escaped
01 September 2013	20:50	<i>Plecotus auritus</i>	M	A	One swollen E	7.7	34.9	
02 September 2013	20:30	<i>Plecotus auritus</i>	F	A	Unknown	7	40.6	
02 September 2013	20:40	<i>Plecotus auritus</i>	F	A	Not obvious	7	37.4	
02 September 2013	20:40	<i>Pipistrellus pipistrellus</i>	F	A	Non-breeding	5	30	

Date	Time of capture	Species	Sex (Male/Female)	Age (Adult/Juvenile)	Reproductive status ¹²	Weight (g)	Forearm length (mm)	Notes ¹³
02 September 2013	21:00	<i>Plecotus auritus</i>	F	A	Non-breeding	10	40.8	Radio tracked from 03 September 2013 (bat 5)*
02 September 2013	21:00	<i>Plecotus auritus</i>	M	A	Swollen E	7.5	39.5	
02 September 2013	21:00	<i>Plecotus auritus</i>	M	A	No swollen E	7.5	38.3	
02 September 2013	21:15	<i>Plecotus auritus</i>	F	A	Post-lactating	8.5	39	
02 September 2013	23:00	<i>Plecotus auritus</i>	F	A	NP	8.25	37.9	
02 September 2013	23:00	<i>Plecotus auritus</i>	M	J	Non-breeding	7	37	
02 September 2013	03:30	<i>Plecotus auritus</i>	F	A	NP	8.5	39.2	
02 September 2013	05:29	<i>Plecotus auritus</i>	F	A	Breeding	9	38.1	Radio tracked from 03 September 2013 (bat 6)*
03 September 2013	20:30	<i>Pipistrellus pipistrellus</i>	F	A	NP	4.5	32.3	
03 September 2013	20:45	<i>Plecotus auritus</i>	F	A	Post-lactating	7.5	38.6	
03 September 2013	22:30	<i>Pipistrellus pygmaeus</i>	F	A	NP	5	34	
03 September 2013	23:20	<i>Pipistrellus pygmaeus</i>	M	A	NP	4.5	30.3	
03 September 2013	00:30	<i>Plecotus auritus</i>	F	A	Post-lactating	9	40.6	

Roosts

4.1.4 Locations of roosts found during the radio tracking study are shown on Figure 3.



- 4.1.5 The female Natterer's bat (bat 1) was tracked to three roosts during the study. The locations of roosts are shown on Figure 3; these were all tree roosts. The roost close to a residential property, north-east of Thorpe Rough, was discovered on the 3 August 2013. It is considered likely to be an ash tree within the garden of a residential property, although this could not be confirmed due to lack of access.
- 4.1.6 The second Natterer's roost was found on 11 August 2013 in a tree within Bascote Heath Wood behind the war memorial along the B4452 (Bascote Heath Road). The third Natterer's roost was found on 22 August 2013 in a large oak tree close to Thorpe Rough and close to the tree roost within the grounds of the residential building. This third roost was noted as likely supporting other Natterer's bats, in addition to bat 1, based on social calls heard on a bat detector (although no visual confirmation was made). The status of these roosts was not confirmed, and bat 1 was determined to be in non-breeding condition, although it is possible that one or all of the trees may have been used by breeding females; a Natterer's maternity roost was found close by, during the tree climbing inspections, within Thorpe Rough.
- 4.1.7 The noctule (bat 3) was tracked to an ash tree along the B4452 (Bascote Heath Road), approximately 500m north-east of Long Itchington and Ufton Woods SSSI. It was frequently found within this tree and was often recorded foraging for approximately two hours locally before returning back to the roost.
- 4.1.8 No roost sites for the Daubenton's (bat 2) were located. The Daubenton's (bat 4) was tracked to an ash tree roost within Thorpe Rough on 28 August 2013. This is considered likely to be a maternity roost, as a minimum of 16 Daubenton's bats were recorded emerging from the roost on 28 August (see Table 2). A second roost for this bat was found on 6 September 2013, also within Thorpe Rough. This roost was in an oak tree within a rot hole on the northern side of the trunk, with staining noted around the hole. The number of bats using this tree was not confirmed.
- 4.1.9 Roosts for the two brown long-eared bats (bat 5 and bat 6) were identified within oak trees in Long Itchington and Ufton Wood SSSI. These trees were close to each other on the north-west edge of the woods. Results of dawn return surveys conducted on 6 September 2013 suggest that the tree roost of bat 6 may have been a small maternity roost, as three bats were observed entering, and the bat was noted as being in breeding condition when caught, although the time of the year makes this less certain.

Table 2: Results of emergence surveys and dawn return surveys on roosts identified through radio tracking

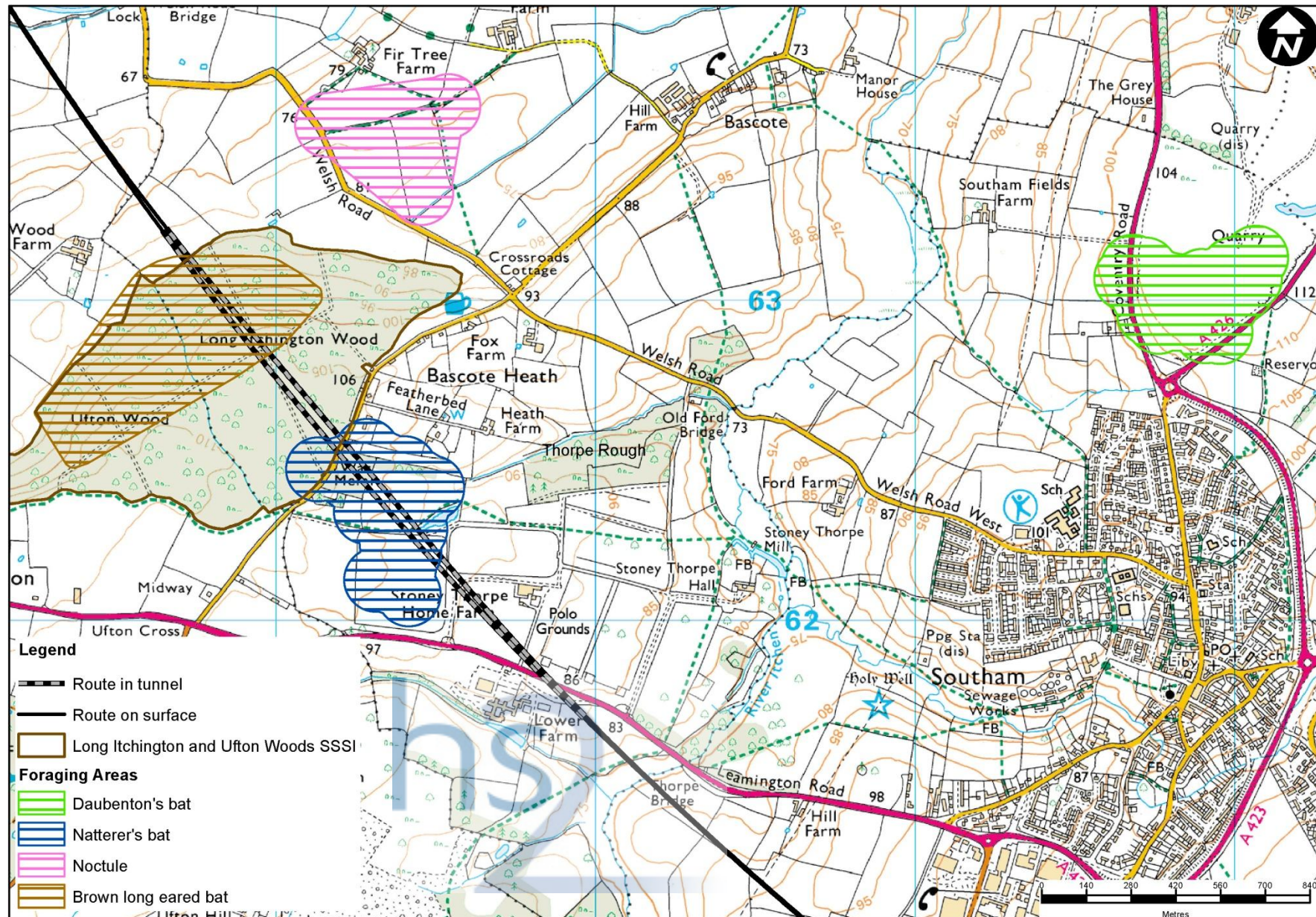
Date	Emergence or return survey	Bat	Roost	Results
28.08.13	Dusk emergence	Daubenton's (Bat 4)	Ash in Thorpe Rough	Emergence from approx. 20:20 until approx. 21:05, 16 Daubenton's emerged from tree
29.09.13	Dusk emergence	Daubenton's (Bat 4)	Ash in Thorpe Rough	11 Daubenton's bats emerged (bat 4 not amongst them)
06.09.13	Dawn return	Brown long-eared (Bat 5)	Oak in Long Itchington and Ufton Woods SSSI	05:57 – probable brown long-eared, flew close to tree, not seen entering

Date	Emergence or return survey	Bat	Roost	Results
06.09.13	Dawn return	Brown long-eared (Bat 6)	Oak in Long Itchington and Ufton Woods SSSI	<p>06:05 – four bats swarming around tree, not echolocating (suspected long-eared)</p> <p>06:10 – one bat entered tree, other bats flew off in easterly direction</p> <p>06:12 – two bats entered tree (suspected long-eared bats)</p>

Foraging areas

- 4.1.10 Key foraging areas for bats have been identified from the radio tracking data. The results did not identify core foraging habitats or tree roosts within land required for the construction of the Proposed Scheme. All were identified within habitats either where the route of the Proposed Scheme is in tunnel or beyond 100m from the land required for the construction of the Proposed Scheme. These results are shown on Figure 4.

Figure 4: Foraging areas identified during radio tracking



Natterer's (Bat 1)

- 4.1.11 For the majority of the evenings on which this bat was tracked, it remained less than 1km from known tree roosts at all times, foraging within the Dallas Burston Polo Club, and along hedgerows adjacent to Long Itchington and Ufton Woods SSSI and hedgerows along the A425 Leamington Road. It was once picked up close to Ufton Hill Farm, just over 1km south of its roost within Bascote Heath Wood.
- 4.1.12 The results of the radio tracking surveys indicate that the core foraging habitat for this bat, during late summer to early autumn, is the habitat within the Dallas Burston Polo Club and hedgerows along the B4452 (Bascote Heath Road) and A425 Leamington Road.

Daubenton's bats (Bats 2 and 4)

- 4.1.13 Both Daubenton's bats spent the majority of their active time at the quarry near Stockton south of Stockton reservoir, just over 2km west of Long Itchington and Ufton Woods SSSI (immediately north of Southam). In particular, habitats in the southern corner of the quarry were favoured.
- 4.1.14 Bat 2 was recorded on the eastern edge of Long Itchington and Ufton Wood SSSI on several occasions and foraging over the Dallas Burston Polo Club grounds. It was also tracked to an area close to the Stockton Reservoir and the Grand Union Canal, just east of Culcutt, over 3km from the land required for the construction of the Proposed Scheme, but only on one occasion.
- 4.1.15 Data for bat 4 is scarcer than for the other tracked bats, as the signal from its tag was often not detected. It was picked up by receivers on seven nights, but often the signal was lost quite quickly. Nevertheless, it was tracked to the Dallas Burston Polo Club on one occasion, as well as close to Myer-Bridge Farm, approximately 4km south-east of its known roost in Thorpe Rough. This bat was recorded most frequently in the southern corner of the quarry near Stockton.

Noctule (bat 3)

- 4.1.16 The male noctule was recorded ranging further than any of the other tracked bats. However, its core foraging grounds were still relatively close to its known roost; it was frequently recorded over arable fields immediately north-west and immediately south-east of its tree roost on the B4452 (Bascote Heath Road), less than 1km to the north-east and east of Long Itchington and Ufton Woods SSSI. It was also frequently recorded over the Dallas Buston Polo Club grounds.
- 4.1.17 The bat was picked up on one occasion close to Welsh Road Farm (approximately 2.5km north-west of the identified roost) and close to Home Farm (approximately 2.5km south-west of the identified roost). The furthest this bat was recorded was on one occasion 4km south-east of the identified roost, near Myer-Bridge Farm.

Brown long-eared bats (bat 5 and bat 6)

- 4.1.18 These bats were always recorded foraging within Long Itchington and Ufton Woods SSSI, which is where the identified roosts were located.

5 Discussion

- 5.1.1 Static, transect and tree climbing surveys undertaken within land adjacent to Long Itchington and Ufton Woods SSSI have confirmed the presence of a diverse assemblage of bat species including barbastelle, Leisler's, noctule, brown long-eared bat, common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Brandt's and Natterer's bat (both confirmed by DNA analysis of droppings found in a tree roost within Thorpe Rough).
- 5.1.2 Trapping was carried out on 14 nights, with 75 bats of eight different species caught. No barbastelle bats were trapped. With this number of bats trapped in total, and with the use of the acoustic lure playing barbastelle social calls, the results would strongly suggest low numbers and/or infrequent use of the habitats by barbastelle.
- 5.1.3 Very low levels of seasonal barbastelle activity have been confirmed within habitats associated with Dallas Burston Polo Club during static surveys. It is considered likely that the main commuting routes to this area are along tall hedgerows within Dallas Burston Polo Club which link the surrounding woodland areas including Thorpe Rough and Long Itchington and Ufton Woods SSSI. No confirmed roost sites, or habitats confirmed to support key foraging and commuting activity by barbastelle have been identified. The presence of the Long Itchington Wood tunnel and Long Itchington Wood green tunnel will minimise impacts on barbastelle, and other species tree roosts and foraging areas identified through trapping and tracking works south of Long Itchington and Ufton Woods SSSI and no adverse effects on the conservation status of the population of barbastelle bat are expected.
- 5.1.4 In summer maternity colonies of barbastelle aggregate and an entire colony may roost in a single woodland. In autumn and early winter however the colonies fragment; becoming less concentrated on a single wood, and may roost in smaller woodlands scattered throughout their summer foraging area¹⁴. Low levels of commuting and foraging activity were recorded during static surveys of barbastelle during autumn months, August and September, although the survey results indicate that the woodlands within the survey area do not support large maternity colonies of barbastelle but use the area seasonally, possibly once maternity roosts located elsewhere have dispersed. As no barbastelles were caught during the trapping, it has not been possible to use radio tracking to gain any further information about this species use of the area around Long Itchington and Ufton Woods SSSI, other than to support a picture of infrequent use of the habitats in the area, at least during late summer to early autumn. No known roost sites for this species are nearby.
- 5.1.5 Radio tracking survey results from four species of bat were collected including Natterer's bat, Daubenton's, noctule and brown long-eared bat. Only a small sample of each species was tracked but the results enabled the identification new tree roosts for each species. Tree roosts were located within Thorpe Rough, Long Itchington and Ufton Woods and surrounding woodland habitats. An exception was the confirmed male noctule roost associated with a mature tree along the side of the B4452 (Bascote Heath Road), to the north of Long Itchington and Ufton Woods SSSI. Confirmed

¹⁴ Andrews, H.L (2012), Bat Tree Habitat Key: Chapter B1 – Tree-roosting bats – A woodland bat species literature review.

roosts include a Daubenton's maternity roost within Thorpe Rough and two brown long-eared bat roosts located within Long Itchington and Ufton Woods SSSI.

- 5.1.6 The results for both Daubenton's bat and Natterer's bat support the assumption that bats regularly move between tree roosts. Three tree roosts used by the single Natterer's bat were identified outside of land required for the construction of the Proposed Scheme, and all of these roosts were located within a relatively small area. Only two tree roosts for Daubenton's bat were found and on several occasions a roost could not be located suggestive that habitats within this area only form a part of a much larger habitat range (used for commuting, roosting and foraging) by this species.
- 5.1.7 The collation of survey results have enabled identification of assumed core foraging areas for a small sample of four species of bat in the local area during the late summer to early autumn period.
- 5.1.8 All of the core foraging areas identified during this radio tracking study, used by Natterer's bat and noctule, are outside of the land required for the construction of the Proposed Scheme.